

mean or target flow rate. You may use the following options instead of recording the respective flow rate of each type of meter:

(1) *Critical-flow venturi option.* For critical-flow venturis, you may use recorded venturi-inlet conditions or their 1 Hz means. Demonstrate that the flow density at the venturi inlet was constant within  $\pm 2.5\%$  of the mean or target density over each test interval. For a CVS critical-flow venturi, you may demonstrate this by showing that the absolute temperature at the venturi inlet was constant within  $\pm 4\%$  of the mean or target absolute temperature over each test interval.

(2) *Positive-displacement pump option.* You may use recorded pump-inlet conditions or their 1 Hz means. Demonstrate that the flow density at the pump inlet was constant within  $\pm 2.5\%$  of the mean or target density over each test interval. For a CVS pump, you may demonstrate this by showing that the absolute temperature at the pump inlet was constant within  $\pm 2\%$  of the mean or target absolute temperature over each test interval.

(c) Using good engineering judgment, demonstrate with an engineering analysis that the proportional-flow control system inherently ensures proportional sampling under all circumstances expected during testing. For example, you might use CFVs for both sample flow and total flow and demonstrate that they always have the same inlet pressures and temperatures and that they always operate under critical-flow conditions.

[73 FR 37322, June 30, 2008, as amended at 75 FR 23043, Apr. 30, 2010]

**§ 1065.546 Validation of minimum dilution ratio for PM batch sampling.**

Use continuous flows and/or tracer gas concentrations for transient and ramped modal cycles to validate the minimum dilution ratios for PM batch sampling as specified in § 1065.140(e)(2) over the test interval. You may use mode-average values instead of continuous measurements for discrete mode steady-state duty cycles. Determine the minimum primary and minimum overall dilution ratios using one of the following methods (you may use a dif-

ferent method for each stage of dilution):

(a) Determine minimum dilution ratio based on molar flow data. This involves determination of at least two of the following three quantities: Raw exhaust flow (or previously diluted flow), dilution air flow, and dilute exhaust flow. You may determine the raw exhaust flow rate based on the measured intake air molar flow rate and the chemical balance terms in § 1065.655. You may alternatively estimate the molar raw exhaust flow rate based on intake air, fuel rate measurements, and fuel properties, consistent with good engineering judgment.

(b) Determine minimum dilution ratio based on tracer gas (e.g., CO<sub>2</sub>) concentrations in the raw (or previously diluted) and dilute exhaust corrected for any removed water.

(c) Use good engineering judgment to develop your own method of determining dilution ratios.

[75 FR 23043, Apr. 30, 2010]

**§ 1065.550 Gas analyzer range validation, drift validation, and drift correction.**

(a) *Range validation.* If an analyzer operated above 100% of its range at any time during the test, perform the following steps:

(1) For batch sampling, re-analyze the sample using the lowest analyzer range that results in a maximum instrument response below 100%. Report the result from the lowest range from which the analyzer operates below 100% of its range.

(2) For continuous sampling, repeat the entire test using the next higher analyzer range. If the analyzer again operates above 100% of its range, repeat the test using the next higher range. Continue to repeat the test until the analyzer always operates at less than 100% of its range.

(b) *Drift validation and drift correction.* Calculate two sets of brake-specific emission results for each test interval. Calculate one set using the data before drift correction and calculate the other set after correcting all the data for drift according to § 1065.672. Use the two sets of brake-specific emission results to validate the duty cycle for drift as follows:

(1) The duty cycle is validated for drift if you satisfy one of the following criteria:

(i) For each test interval of the duty cycle and for each measured exhaust constituent, the difference between the uncorrected and the corrected brake-specific emission values over the test interval is within  $\pm 4\%$  of the uncorrected value or applicable emission standard, whichever is greater. This requirement also applies for CO<sub>2</sub>, whether or not an emission standard applies for CO<sub>2</sub>. Where no emission standard applies for CO<sub>2</sub>, the difference must be within  $\pm 4\%$  of the uncorrected value. See paragraph (b)(4) of this section for exhaust constituents other than CO<sub>2</sub> for which no emission standard applies.

(ii) For the entire duty cycle and for each regulated pollutant, the difference between the uncorrected and corrected composite brake-specific emission values over the entire duty cycle is within  $\pm 4\%$  of the uncorrected value or the applicable emission standard, whichever is greater. Note that for purposes of drift validation using composite brake-specific emission values over the entire duty cycle, leave unaltered any negative emission results over a given test interval (i.e., do not set them to zero). A third calculation of composite brake-specific emission values is required for final reporting. This calculation uses drift-corrected mass (or mass rate) values from each test interval and sets any negative mass (or mass rate) values to zero before calculating the composite brake-specific emission values over the entire duty cycle. This requirement also applies for CO<sub>2</sub>, whether or not an emission standard applies for CO<sub>2</sub>. Where no emission standard applies for CO<sub>2</sub>, the difference must be within  $\pm 4\%$  of the uncorrected value. See paragraph (b)(3) of this section for exhaust constituents other than CO<sub>2</sub> for which no emission standard applies.

(2) For standards consisting of multiple emission mass measurements (such as NMHC + NO<sub>x</sub> or separate NO and NO<sub>2</sub> measurements to comply with a NO<sub>x</sub> standard), the duty cycle shall be validated for drift if you satisfy one of the following:

(i) For each test interval of the duty cycle and for each individual mass, the

difference between the uncorrected and the corrected brake-specific emission values over the test interval is within  $\pm 4\%$  of the uncorrected value; or

(ii) For the entire duty cycle the difference between the combined (e.g. NMHC + NO<sub>x</sub>) uncorrected and combined (e.g. NMHC + NO<sub>x</sub>) corrected composite brake-specific emissions values over the entire duty cycle is within  $\pm 4\%$  of the uncorrected value or the applicable emissions standard, whichever is greater.

(3) If the test is not validated for drift, you may consider the test results for the duty cycle to be valid only if, using good engineering judgment, the observed drift does not affect your ability to demonstrate compliance with the applicable emission standards. For example, if the drift-corrected value is less than the standard by at least two times the absolute difference between the uncorrected and corrected values, you may consider the data to be valid for demonstrating compliance with the applicable standard.

(4) The provisions of paragraph (b)(3) of this section apply for measurement of pollutants other than CO<sub>2</sub> for which no emission standard applies. You may use measurements that do not meet the drift validation criteria specified in paragraph (b)(1) of this section. For example, this allowance may be appropriate for measuring and reporting very low concentrations of CH<sub>4</sub> and N<sub>2</sub>O as long as no emission standard applies for these compounds.

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**§ 1065.590 PM sampling media (e.g., filters) preconditioning and tare weighing.**

Before an emission test, take the following steps to prepare PM sampling media (e.g., filters) and equipment for PM measurements:

(a) Make sure the balance and PM-stabilization environments meet the periodic verifications in § 1065.390.

(b) Visually inspect unused sample media (e.g., filters) for defects and discard defective media.

(c) To handle PM sampling media (e.g., filters), use electrically grounded